

## **Why is the teaching of Mathematics in such a crisis - a perspective from the tip of Africa.**

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This year approximately 3600 teachers will die of AIDS in South Africa. In the year 2005 it will be approximately 8000. In 1997 about 2300 new teachers qualified from our universities and education colleges - this year it will only be in the region of 400. This clearly constitutes a crisis. But teachers are not only dying of AIDS, very few people are going into teaching in South Africa at the moment.

A colleague of mine relates the story that when he decided to become a teacher in the U.K his family were overjoyed - being a teacher meant you had status, and so did your family. In the South African context this is exactly the opposite. Recently I decided to promote teaching as a career to one of my classes. They fell over laughing - of course, that made me feel really great!! Teaching was not even an option for them - and sometimes, when I've had a bad day, I have had to agree with them. Teachers, like parents, are taken for granted. Last year one of the major universities in South Africa advertised countrywide for bursaries for prospective education students. Everything would be paid for - books, fees, residence etc. The response - 2 applications. Needless to say, the course had to be abandoned. What a depressing statistic! Mathematics teachers are also leaving the profession for various reasons, the least of which, is not the salary. The pay for teachers in our country is not great and to perhaps use the cliché once more - "If you pay peanuts, you get monkeys". A colleague of mine, upon leaving his post at a top university, doubled his salary at an insurance company. A year later he changed companies and they again doubled his salary! Our future looks bleak if we can't keep our teachers in the profession.

The crisis in South African education has a history and a legacy, which we have not yet been able to get rid of completely. The lack of discipline in many schools is still huge - both from teachers and pupils. This stems from the 1970's where pupils were given the power by revolutionary forces to make the country ungovernable. Pupils to this day, still think they can run the school. In the 1980's there was a policy "Pass one, pass all" and in those circumstances it is almost impossible to maintain standards. An added problem was that some pupils stayed at school till they were 28 years of age. With approximately 55 murders a day in our country, teachers rather tread lightly, than take on some 18 year olds who haven't done their homework - you could get a knife stuck in your back.

In Mathematics teaching the lack of training is one of the biggest problems. A teacher who only has a school-leaving certificate herself faces many a class in grade 12. Resources and teacher support material is an added hassle.

Having said all this we have seen many desperately poor schools do very well due to high levels of expectation and discipline - one can be successful against almost all odds!

Teachers in our country often teach maths not because they love the subject but because it provides them with a secure job. With the high unemployment - who can blame them? But what that generally does in terms of their attitude is obvious.

Corporal punishment was banned by the government in the 1990's - and probably rightly so. But what does a female teacher do, in a class of 50 grade 12's, many of whom are over the age of 20 when they refuse to listen or do their work?

In our primary schools a few years back "New Maths" was introduced. It was a great idea, as the methods of teaching, were to a large extent by rote and very little understanding. There was however no training for the teachers that went with it and what started off as a good idea ended up in chaos for many schools. Teachers are on the whole very conservative and must see very good reasons to change, otherwise they dig in their heels. In my opinion, if you use the constructivist approach and do it badly, it's a whole lot worse than the old method, done well.

Teachers in the primary schools are also 'generalists'. They teach most subjects and thus their training is not specialised in Mathematics. One might think that at that level it is OK but I have found the

opposite. Without some rigorous training in Mathematics and of course the necessary interest in the subject the teachers are often found wanting. And again - can one blame them? Having to go from a Biology lesson to Poetry to Mathematics and then to the cricket pitch or squash court....!

In the Eastern countries it is very different - teachers at the primary level are highly qualified. We've heard it often: if the foundations are not good, how can the rest of the building stand? Why then don't we put our best teachers at the bottom?

You might say that the learning that happens in the Eastern countries is rote - well my experiences in Hong Kong and what we see in our classes is very different. Many of our top achievers are from the East - also in investigative and non-routine Mathematics.

During one of my visits to Hong Kong I met a fellow by the name of Chong. He talked about the culture of learning in the East, how teachers are still respected and esteemed. But he also mentioned something that I found very interesting. He said that because of the poverty in large parts of China the children don't have computer games and TV and spend a lot of their time playing games with paper and pen - something that is affordable to most. These strategy games obviously get the mind ticking at an early stage and must surely make a difference when they do Mathematics later. Their language and writing is of course also so much more complicated than ours, and this must surely make a difference as well.

In our modern day society, parents don't play games with their children in the evenings anymore. What happened to Rummicub evenings or Monopoly days? What about chess? There is an Afrikaans school not far from ours that makes chess compulsory in the junior classes. Now that makes a whole lot of sense to me. If I do this move, then she will do that, or perhaps move the queen, but probably not the castle etc. I wish some of our politicians had played some chess when they were small. Watching TV is just such a passive pass time. You don't have to think - much like in the classroom when you have a teacher that spoon-feeds the kids. I believe that TV is the single greatest killer of creativity in all spheres of learning. Apart from creativity there are a whole lot of other evils that Hollywood has brought into our lounges, but we won't get into that now.

Something I have also found interesting is that with all the group work and cooperative learning going on, pupils find it very difficult to sit down with a problem on their own and work at it. They immediately turn to their friends and start talking discussing it. *Together Everyone Achieves More* - yeah, but it does have drawbacks that one must be careful of. It's that fine balance between the old, when we were told to not to say a word in class, and the new which stresses that group work is vital.

As for listening - I find pupils absolutely appalling! Has that always been the case? I do listening skills with my junior classes while practicing their tables and bonds. What is  $123 \times 8$ ? I say it once and they have to do it without pen and paper. What they find more difficult is a word sum. For example: "A bus leaves Pretoria at 8h37 and arrives in Johannesburg at 9h25. How long was the journey?" The pupils need real training, as they always want you to repeat things. Maybe the three or four replays they see in sport on TV has something to do with it?

An old Mathematics teacher once said something to me, which made a whole lot of sense. He said, "In Mathematics you can get 0% - with subjects like philosophy or English where one expresses an opinion this is not the case." I think that this is one of the main reasons why Mathematics has become such a problem subject for so many people. The danger is that I could get 0 out of 20 for a test. I often tell my bright pupils that Mathematics is a wonderful leveller. Even the best get stuck at times and that is a good position to be in once in a while as a pupil, because in later life you will be stuck many times and hopefully the problem solving strategies that one learnt in the Mathematics classroom will pull you through. The motto for our Mathematics department used to read "*We will give them problems so that life down the road won't*".

(This was inspired by an advert for a text book.)

I have had girls that out of 6 subjects get 5 easy distinctions, but just can't get it in Mathematics. Often one can see them through certain difficulties and then they fly, but often their mental block is just too great. Alex was one such girl. Only in her final school leaving exams did she pull through and chatting to her father later, he agreed - "that was the only distinction that counted".

The perception that Mathematics is difficult is so widespread that it's almost impossible to convince people otherwise. And parents can sometimes be our greatest enemy. At parent interviews they sit down with their child and say things like "*O well, I could never do Mathematics when I was at school*".

Together with this fear of failure, is the perceived uselessness of the subject. Kids often ask "*where will I ever see this again in later life?*" and the answer is of course "*nowhere*"! It seems to make more sense when they learn their verbs in French because they can see an end and a reason. Most people never pursue Pure Mathematics further than high school and thus never see the reason to have learnt it in the first place. But then you talk to accountants, engineers, business people, quantity surveyors etc etc and the tune has changed.

I prescribed the book "Fermat's Last Theorem" by Simon Singh for our grade 9 classes this year. Our English head of department was very excited when he read it, as it opened up a whole new world to him of what Mathematics actually was and could be. The pupils are also enjoying it tremendously and we are going to assess them on their progress. Hopefully some old perceptions will be changed through their reading of this fantastic book.

I saw an advert recently for some teaching aid or extra lesson organisation. "*Remember, Education has never been such fun*". I thought about that for a long time. Yes, our lessons need to be interesting, stimulating and fun if possible. But sometimes there are certain sections that don't appeal to you and are thus plain and simply boring. Do I then have permission to just switch off? I find myself competing with the TV, with all the bells and whistles of fancy computer games, the movies and many other forms of entertainment. If we don't put up a similar performance in class the pupils switch off. But somehow I believe that all serious academic endeavour will include some "*I don't like this but I'm going to hang in there and do it*". The average attention span of pupils today is decreasing at an alarming rate.

I have a suspicion that we need a renaissance in our Mathematics education - in terms of curriculum, perceptions of the masses and the attitude to learning of our pupils. I find more and more that teenagers actually don't care anymore. Their attitude in class lacks urgency. I have come to believe that maybe our lessons need to be voluntary in the upper grades. Teenagers must be given real responsibility and must feel real consequences for their actions. So if I choose not to attend class, I must realise that the teacher will not help me if I get stuck. Are we prepared to make the radical changes that are necessary, or are we just going to continue to patch the problems with band-aid strips as they come up?

When talking about the problems we face in Mathematics and the teaching thereof one can get quite depressed but I think we mustn't forget that if we do our job with enthusiasm, we can positively affect the lives of hundreds of human beings and through what the pupils have learnt in our classes, the world can become a better place.